18: The Normal Distribution

Stat 120 | Fall 2025

Prof Amanda Luby

Suppose weights of newborn babies in one community are normally distributed with a mean
of 7.7 pounds and a standard deviation of 1.25 pounds
1. Use the 95% rule to sketch a graph of this normal density curve. Include a scale with a least three values on the horizontal axis.

4. APM Research Lab ran a survey of likely Minnesota voters between Sept 16-18 of 2024.

The margin for error, according to standards customarily used by statisticians, is no more than \pm 3.5 percentage points. This means that there is a 95% probability that the "true" figure would fall within that range if all voters were surveyed. The margin for error is higher for any subgroup, such as a gender or age grouping.

They reported 48.4% in support of the Harris/Walz ticket, and 43.3% in support of the Trump/Vance ticket.

rum	ap/Vance ticket.
(a)	How do you feel about this summary of a confidence interval (for a public/non statistician audience)?
(b)	What is the standard error for each of these estimates?
(c)	Build a 95% confidence interval for one of these proportions
(d)	Use the normal distribution to instead build a 99% confidence interval for one of these proportions

The report also says:

Overall margin of error = 3.5 percentage points (and therefore approximately 7 percentage points for the difference between two data points)

(e) Use this information to build a 90% confidence interval for the difference in proportions between the Harris/Walz supporters and the Trump/Vance supporters.

5. True or False?

- (a) The central limit theorem says that the population distribution is approximately normal if the population is big enough.
- (b) The central limit theorem says that the sampling distribution for the mean of a random sample is approximately normal if the sample is big enough.
- (c) The central limit theorem says that the sampling distribution for the mean is only normal if the population distribution is normal.
- (d) The central limit theorem says that any statistic is normally distributed if the sample size is big enough.
- (e) The central limit theorem applies to proportions and means
- 5. Using pnorm or qnorm, find the following quantities.
 - (a) P(Z < .25)
 - (b) P(Z > 1.5)
 - (c) P(-.5 < Z < 1.5)
 - (d) z^* where $P(Z < z^*) = .33$
 - (e) z^* where $P(Z > z^*) = .33$
 - (f) P(X < 10) where $X \sim N(15, 22)$
 - (g) P(X > 40) where $X \sim (15, 22)$

When you're done...

Please make sure that 1 person submits your group answers to gradescope, and includes all folks on the submission $\frac{1}{2}$